From the house of **Amar Chitra Katha** and **Tinkle**

BRAINWAVE™

Science is just a game!

Vol. 03 Issue 06
June 2014
48 pages
8-15 years
₹60

Stories, DIYs & Comics

10+ contests to win!



Holiday special - The Science We Eat

p24 Free Poster!

/brainwavemag

Join 51k other fans!

Web-only Content

www.bwmag.in

p44 Smartenstein

Win maximum contests in the issue to become a 'Smartenstein'!

p22 Fan Fiction

Who was Gobbler?

Brainwave Science Magazine simplifies textbook science for 8-15year-olds. It makes lessons interesting by presenting them in the form of comics, stories, DIYs, fascinating facts, contests and much more. Grab your copy now! For subscription, turn to page 48.

AD

The Science we Eat!

My young friends

About 30 percent of all the food produced on the Earth is never eaten. Though the world produces enough to feed all its human inhabitants, the problem is with distribution - the food doesn't always get to the people who need it.

In this issue, while you learn from and enjoy the various science about the food we eat, I urge you to also appreciate its value and never waste it.

By the way, did you know that some people in China say that their use of chopsticks (and not knives and forks) for eating reflects the importance of scholars over warriors in Chinese culture! And have you heard about the cubic watermelons the Japanese grow? Dive in for more such science and fun!

SK, sasikanth.c@ack-media.com

Cover artwork by **Parvati Pillai**



No part of this magazine may be reproduced without the express consent of Amar Chitra Katha Private Limited (ACK). Any reproduction, modification, distribution, transmission, republication, display or exploitation in any way of the content(s), in whole or in part, of this magazine is strictly prohibited. ACK makes no warranties or guarantees, express or implied, written or oral, as to the contents of the magazine, the information, materials or opinions, included in this magazine. In no event shall ACK be liable for damages of any kind arising as a consequence of using or following any method or formula as mentioned in the magazine, including but not limited to direct, indirect, incidental, punitive and consequential damages.

Consumer Complaints:
+91-22-6629 6999
customerservice@ack-media.com

Business Queries & Customer Service Escalations:
sasikanth.c@ack-media.com

Ad-sales:
advertisingsales@ack-media.com

Credits:
Neeti Saxena & team
Eric D'souza & team
Heta D, Shilpi M & team
India Book House & team
Janak F, Yogesh G & team
Jayanthi V
K.K. Arun & team
Lalit S & team
Mayur S & team
Narayan M, Sagar S & team
Sandeep S & team

Sr. VP Operations
Sandeep Padoshi

Digital Business Head
Shubhadeep Bhattacharya

Sr. VP Sales & Marketing
Prakash Batna

BRAINWAVE™
Vol. 03 | Issue 06 | June 2014

Editor & General Manager
Sasikanth C

Consulting Art Director
Savio Mascarenhas

Assistant Editor
Priyanka Talreja

Design Lead
Ria Rajan

Designer & Illustrators
Saudamini T & Pooja P

Junior Illustrators
Jeenal Patel

Resident Geek
Pushkar Samant

Founding Editor & Art Director
Vinayak Varma

Advisory Board
Arvind Gupta
Scientist & Educator
AS Manekar, *Dy.Director*
National Council of Science Museums
Hari Parameswaran
Scientist & Educator
Dr. Chandrakant Shukre
Astrophysicist
Maya Menon, *Director*
The Teacher Foundation
Geetha Narayanan, *Director*
Srishti School of Art, Design & Technology
Dr. Balaji Sampath
Aid India Foundation
Siddharth Rao, *Director*
Agumbe Rainforest Research Station

Subscriptions:
brainwave@ack-media.com

Brainwave is Printed and Published by Vijay Sampath **on behalf of** Amar Chitra Katha Private Limited **Printed at** Indigo Press (India) Pvt. Ltd., Plot No. 1, C/716, Opp. Dadoji Konddeo Cross Road, Byculla (E), Mumbai 400027 **Published at** Krishna House, 3rd Floor, Raghuvanshi Mills Compound, Senapati Bapat Marg, Lower Parel (West), Mumbai 400013.

Copyright © 2014, Amar Chitra Katha Private Limited. All rights reserved.

Vol. 03 | Issue 06 | June 2014

BRAINWAVE™

CONTENTS

WHAT'S ON YOUR PLATE ?

COVER STORY 12



KNOW IT ALL

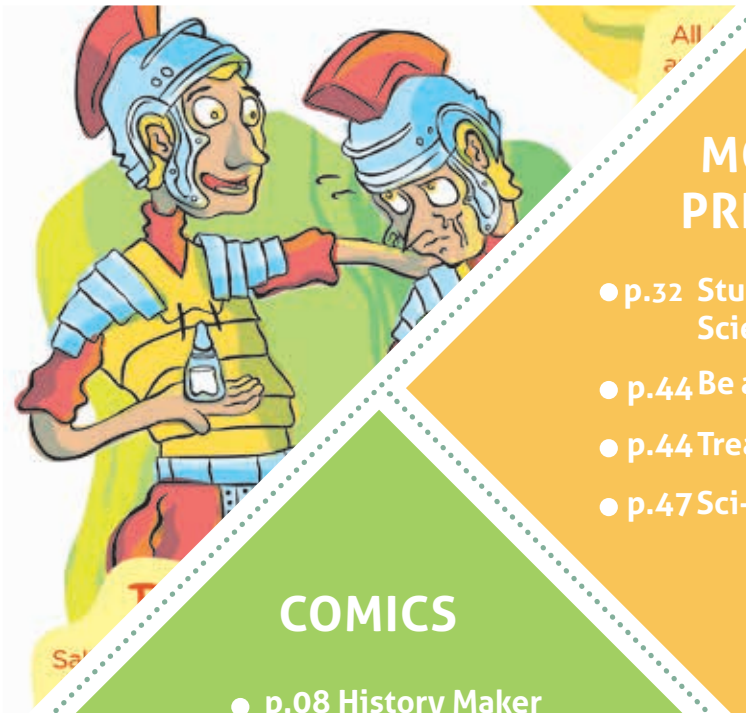
- p.05 Ask Us Why
- p.11 Flash News
- p.18 Golden Gizmo
- p.33 India Page
- p.34 Globe Trotter
- p.38 Planet Ninjas

FUN FACTS

- p.28 Expert Talk
- p.35 Story Storeys
- p.36 Evil Science
- p.39 Wacky Tech
- p.45 Freaky Science
- p.46 Arby Files

In which we make bouncy eggs, go on a 'salt' journey, help Santa with his obesity, know why Indians eat food with their hands and a lot more...

Aptitude guide: Beginner Medium Advanced Common



MORE PRIZES!

- p.32 Student Board ★ Science X-plained
- p.44 Be a Smartenstein ★
- p.44 Treasure Hunt ★
- p.47 Sci-Q Time ★

COMICS

- p.08 History Maker
- p.10 Toon Talk
- ■✚ p.19 Science Fiction
- ■ p.40 The Smarties

FREEBIES

p.24 Poster



READER CONTRIBUTION

- p.22 Fan Fiction ★
- p.27 Letters From Readers
- p.27 Solutions & Winners

FUN-DO & LEARN

- ✚ p.06 Toybox ★
- ■▲ p.31 Eye See ★
- ■✚ p.42 DIY ★
- ✚■ Web only - Magic Science ★



Words tagged with G have been explained on page no. 47.

★ Win a gift!

MEET THE SMARTIES

Beyond the skies, trouble brews.
Danger awaits us, all humans!
Sneaking and lurking in the dark,
Someone's plotting to tear humanity apart.

Much before they act, our friends arrive to thwart the attack,
1... 2... 3... Go! The Smarties arrive fast.
Yes they are here, look!

The Smarties rarely punch down opponents - they are peace lovers.
They use not only brawn, but also brains!

The battle's won; let us meet them now,
They are real heroes - take a bow!

Dr. Dodo, dear friends,
is the only Dodo alive.
The wise elderly scientist,
his ideas save many a life!





Skree! is mysterious,
a bearded Toda lady.
Up her sleeves,
she has tricks aplenty!

Young Arby is the great Indian mathematician.
Sucked into BW Labs by Dr. Dodo's time-machine,
Grow up to be Aryabhata,
yes he will fine!





Young Alby's none other than Albert Einstein.
Sucked in time by Dr. Dodo's Galileo one,
He will soon change the history of science!

Mr. X is the antagonist,
Top IQ of the universe
is his! Opposing ideology
than the Smarties,
Is he good? Is he bad?
You analyse.





Earth, wind, water and fire combine to make
Bhoo - an enigma,
She is a superhero -
every villain's dilemma.

Now that you know them, see their wonders,
The episode begins, the Earth's saved from plunder.

www.bwmag.in/meet-the-smarties

by **Sasikanth C**

Why do old people have grey hair?

– Rohan Garg

While I sift through the numerous responses I received to the question I asked in the April 2014 issue's Ask us Why, I will answer this.

Grey hair needn't always be associated with 'old'. Some people start growing grey hair when in their 20s and they are perfectly healthy. Though greying age is hereditary, extreme shock or stress and poor nutrition can also be causes of grey hair, irrespective of the age.

Our hair contains pigments[G] called melanocytes. The melanocytes produce melanin, which is black or dark brown pigment that also determines our skin colour.

Some cells in our body use melanin and produce keratin, the chief protein in hair. When the keratin-producing cells die, hair retains colour from melanin. When the melanocytes become less active and die, less or no melanin is deposited into the hair and it appears lighter.

Do you have any friends who have brown or reddish hair? Why do you think hair colours vary? Does it depend on the country the person is from?
Research and email the science behind this to me. The most original answer wins a surprise gift hand-picked by me!



Image source: wikimedia commons
A collage of a variety of human hair colours

Have a burning question? Email to *brainwave@ack-media.com* with 'Ask Us Why' as the subject. The best question gets published and wins a cool Amar Chitra Katha comic!

bouncy egg:

Let's turn a regular egg into a rubbery bouncy ball!

by **Pushkar Samant**

You will need:-

- an egg
- vinegar
- a glass



Method:

Step 1



Place the egg in the glass.

Step 2



Pour the vinegar into the glass so that the egg sinks completely.

Step 3



The acid in the vinegar reacts with the egg shell. You can see bubbles around the egg.

Step 4



Leave the egg in the vinegar for at least two days.

Artwork: Jeenal Patel

Watch the video at: *www.youtube.com/watch?v=6jfqqzKSNsE*

Step 5



After two days, take the egg out of the glass and wash it carefully under tap water.

Step 6



If you have used a boiled egg, it would be white. A raw egg will look yellowish.

Step 7

Your bouncy egg is ready!

Be careful while playing, if the egg you have used is raw.



Why does this happen?

The acetic acid in vinegar dissolves the calcium carbonate of the egg shell. But, the membrane under the shell remains intact, resulting in a rubbery toy.

Now, here is a challenge for you. You have to make an egg stand upright. Can you?

Send a photo of your standing egg to *brainwave@ack-media.com* to win cool ACK comic books!

THE Spice OF LIFE

Written by Sasikanth C
Artwork by Agustín Dib



By the way, did you know that there are many kinds of salt? Each type has its own distinctive flavour, colour and texture. Table or seasoned salt is the most common kind that we use.





Iodized salt serves as a dietary supplement to prevent thyroid disease. You must have seen many ads about this on TV, right?



Then are rock and pickling salt. Rock salt is large crystal salt and has a gray shade because minerals are not yet removed from it. Pickling salt is similar to table salt, but without ionone[G] and anti-caking additives.



All this is fine, but how do we produce salt? There are two main sources – rock salt and sea water. It is extracted from underground beds by mining and in general, by evaporating sea water. Never thought there was so much to such a simple ingredient, huh?



Did you know?

Salt has always been of high value to humans. It is believed that Roman soldiers were at times paid with salt! Have you ever heard that someone is 'worth their salt'?



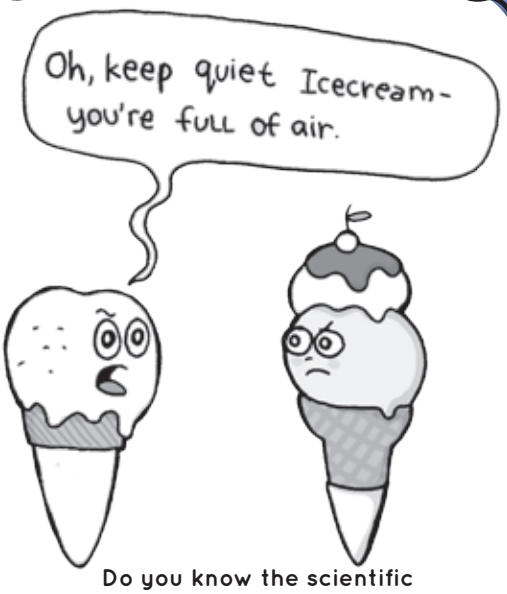
POINTS TO PONDER

What is the chemical formula of salt?
What is it made of?
What happens if we consume too much of salt?

The End.



Imagine eating 3 buckets of stew, 3 washbasins of rice, one bedside drawer full of Sushi, two cushion sized portions of meat, one large shopping bag of veggies and 20 ladles of sweet syrup every day! Did you know that a young man who is preparing to be a Sumo wrestler has to eat 20,000 calories worth of food every day?



Do you know the scientific difference between gelato, regular ice cream and soft serve? Gelato contains no air, while regular ice cream contains up to 50% and soft serve contains up to 60%!

Artwork: Alicia Souza



Liquid nitrogen has a temperature of -196 degrees Centigrade. It can rapidly cool down an ice cream mix. Using this, just like instant noodles, you can make instant ice cream. Do not touch the nitrogen or inhale the fog, though!

McDonald's site asked employees to quit eating fast food

Everyone was in for a shock when it was revealed that the fast food giant McDonald's internal employee resources site warned workers to avoid eating too much fast food, including the kind served at McDonald's.

According to CNBC, one post on the site said, "Fast food is a quick, reasonably priced, and readily available alternative to home cooking."

"While convenient and economical for a busy lifestyle, fast food is typically high in calories, fat, saturated fat, sugar and salt, and may put people at risk for becoming overweight," the site further added.

The content was apparently designed by a third party vendor. It was located in the site's 'Health Encyclopedia' section. One post even bashed a meal of a burger, fries and soda (McDonald's staples) as an 'unhealthy choice' and went on to say that people with high blood pressure, diabetes and heart disease must be very careful about choosing fast food because of the fat, salt and sugar levels!

In response, McDonald's highlighted the new, healthier menu options that they have added in recent years, such as egg whites and fruit smoothies. "We don't sell junk food," said McDonald's CEO Don Thompson, defending the company's food.

Source: economictimes.indiatimes.com ■

Himachal HC orders ban on junk food packed in plastic



Image Source: Wikimedia Commons

In a landmark judgment, the Himachal Pradesh High Court called for a complete ban on sale of potato chips, wafers and all other junk food-items packed in non-biodegradable and plastic material.

The court put a ban on entry, manufacture, storage, supply and sale of these items in the state. It directed the government to strictly enforce the ban on these nonessential packaged food items. The ban, however, will not include packaged drinking water.

The court has also directed the government to ensure that edible oils or fats are not sold in plastic bottles or pouches. They should be packed in tin containers.

Passing specific directions for the enforcement of food regulations, the bench ordered the state government to ensure that no food stuff, including primary and essential food, is manufactured, packaged, distributed, transported and sold without conforming to the Food Safety & Standards Act, 2006 and Food Safety & Standards (Packaging & Labelling) Regulation, 2011.

The Court further directed the government to ensure that no one is permitted to commence or carry on any food business without obtaining a license.

Source: www.indianexpress.com ■



Artwork: Jeenal Patel

What's on your plate?

The Smarties were sitting cozy in their cave when the strangest thing happened - in came a red envelope! What did this mean?

by **Priyanka Talreja**

The day at the cave began as a regular one. The Smarties were all geared up to leave for their routine field trip around the Earth when they heard a strange sound - that of wings flapping. The sound was so vigorous that the Smarties were certain that some bird needed help. Before the others could react, Alby ran outside to inspect.

Alby soon returned with a huge fluffy red envelope. The envelope had wings!

"What's this?" asked Alby in awe, as he handed it over to Dr. Dodo.

"This can't be what I think it is," wondered Dr. Dodo, as he took the envelope and opened it carefully.

As soon as Dr. Dodo pulled the letter out, the red envelope chirped a "Bubye" and flew away!

Dr. Dodo read the letter with great intensity and declared, "I have to leave."

"Anything wrong, Dr. Dodo? What's happening?" asked the other Smarties.

"Santa himself has written to me, Alby. He needs my help, and he needs it quick!" explained Dr. Dodo.

"Santa?? What's the matter? Can we help?" Arby questioned eagerly.

"Well, dear, I can't disclose that. This problem, he doesn't want anyone to know of. He says that it is a matter of secrecy."

The Smarties understood. They knew that not all matters could be discussed with everyone. They respected privacy.

Soon, Dr. Dodo hopped on to the fastest jet parked in their cave and fed Santa's address into the jet's GPS system.

Within the next few minutes, the jet landed in Lapland. As soon as Dr. Dodo got off, a tiny, but majestic looking elf greeted him. He led Dr. Dodo into a passage secretly carved into the heaps of snow and ice.

After walking for a couple of minutes in complete darkness, Dr. Dodo and the elf entered the stunning Santa's factory. There were hundreds of thousands of gifts being packed meticulously. Christmas carols echoed all around and the whole place smelled of melted chocolate.

It was easy for someone to get lost amidst all the commotion. So did Dr. Dodo. While taking in the sights, smells and sounds, he didn't realise that he had stepped onto a walkalator until he was standing outside Santa's cabin. He stepped in with great cheer to greet Mr. Claus. But, when he looked at Santa, he was shocked. Santa Claus looked big! Very, very big.

"Hi Santa," Dr. Dodo managed to squeak out.

"Yes, that's the reaction I expected, Dr. Dodo," said Santa. "I have put on a great deal of weight. I am afraid that I'm now so obese that I can't move!"

"I see the cause of your worry," said Dr Dodo.

"Dr. Dodo, my worries only

double now because Christmas is inching closer. And, I won't even fit into the carriage! How am I going to delivering all the gifts to all the deserving kids around the world? And how will I fit into chimneys without getting stuck?" blabbered Santa non-stop, with great worry.

"Well, don't worry Santa. Now that I am here, I will solve your problem. I know exactly what's wrong. Let's start without much ado. We can't rob the kids of Santa, can we?" said Dr. Dodo.

"Santa, to fight obesity, you first need to know about food. All living organisms require food and food has six main types of nutrients - carbohydrates, proteins, fats, vitamins, minerals and water. What's happening in your case is simple - you are being so busy that you are not balancing your diet the right way."

"What do I do now, Dr. Dodo?" asked Santa, still concerned.

"Well, start with the basic awareness of what's on your plate! You must always be aware of how the different foods are affecting you."

"Ahh," said Santa. "I see."

"Let me begin explaining with carbohydrates. carbohydrates are compounds of carbon, hydrogen and oxygen, always in the ratio of 2:1:1.

Carbohydrates include starch and cellulose. These are oxidised in the body into simple sugars. When oxidised, one mole of glucose releases 686 kilocalories of energy!

Carbohydrates are present in foods like rice, potato, sweets, etc. These are important for us because they act as a great source of energy.

"Oh! That's very interesting. Please continue," said Santa.

"To control obesity, you need to regulate the intake of carbs," continued Dr. Dodo.

"Let me also tell you about Fibre. Fibre is a type of carbohydrate that the body can't digest. Though most carbohydrates are broken down into sugar molecules, fibre can't be. Instead, it passes through the body undigested. It helps regulate the body's use of sugars, helping keep hunger and blood sugar in check. So, Fibre is really important too. Great sources are whole fruits, vegetables, whole grains, and beans.

"Fibre's going to be my new best friend!" exclaimed Santa.

"Good. Next is protein. These are composed of carbon,



Artwork: Jeenal Patel

hydrogen, oxygen and nitrogen. Nitrogen is the most essential element in proteins. Some proteins contain sulphur and phosphorus too.

Amino acids[G] are the simple, smaller units of proteins. Proteins are very important to us because they provide chemical material for the growth and repair of body cells and tissues. In emergencies, they may also be oxidised to release energy.

Foods rich in proteins include lean meat, fish, eggs, milk, cottage cheese, nuts, beans, peas, etc. Proteins are, hence, a great form of nutrition.

"I just have to start gorging on my beans!" declared Santa.

"You must! Now, let's move to the major issue in your case – Fats. Fats are also composed of carbon, hydrogen and oxygen. It's just that they have very little oxygen content.

Fats produce more energy than carbs. Fat below the skin protects the body against rapid loss of heat and is an important form for storage of food. The most common foods rich in fats are butter, cream, ghee and oils, which you have been eating a lot."

Santa sheepishly looked at Dr. Dodo and conceded, "Yes. I couldn't help but gulp down my fries with extra mayonnaise before every meal."

"Now, minerals. These are needed in the diet in small quantities. Some important minerals we all need are calcium, phosphorus, iron, sodium and iodine. These are obtained from table salt, green vegetables and fruits."

"I can now see the cause of my obesity, Dr. Dodo. I think I know what's going wrong."

"Yes Santa. It's as simple as knowing what you're eating and how it will affect your body.

Finally, let me explain about vitamins. These are chemical substances that help maintain a healthy body."

"Vitamins A, D, E, and K are fat soluble and can be stored in the body for longer periods. Vitamin B complex and vitamin C are water soluble, and can't be stored for long periods in the body.

- Vitamin A: Promotes growth and vision, and is present in butter, egg yolk, milk, carrot, etc.
- Vitamin D: Helps the body absorb calcium and phosphorus to strengthen bones and teeth. It is present in fish liver oils, milk, eggs, etc.
- Vitamin E: Prevents the oxidation of vitamin A, and is present in meat, milk, whole wheat, etc.
- Vitamin K: Helps in clotting of blood during injuries. It's present in cabbage, leafy vegetables, etc.
- Vitamin B complex: This is needed for a healthy brain, nerves and muscles. It's present in wheat, rice, liver, etc.
- Vitamin C: It helps fight diseases like the common cold, and is present in oranges, tomatoes, lemons, guavas, etc."

"And dear Santa, you must consume lot of Water! It helps the body get rid of toxic wastes through urine and sweat, and to absorb the nutrients in food.

So, the most important thing is a balanced diet - a diet that contains all the principle nutrients AND in proper quantity," concluded Dr. Dodo. "I will leave now, and leave you to do some soul-searching to get your health in order."

"I sure will! Thank you very much, Dr. Dodo," Santa said and to show his gratitude, he handed over a huge package to Dr. Dodo, to share with the Smarties.

They shook hands and cheered as they knew that the Christmas was saved. ■

LOOK BEFORE YOU EAT!

Microorganisms are just about everywhere. Hiding here or sneaking there, they are difficult to find. We at Brainwave went looking for them, armed with our super electron microscope. Surprisingly, we did not have to go beyond the food we eat to meet loads of them!



We started with a shy little bacterium called **Rhizobium.** We spotted it in the pea plantation in the corner of our office.

"I LIVE IN THE ROOTS OF PLANTS IN LITTLE LUMPS CALLED ROOT NODULES. I AM EXTREMELY IMPORTANT TO PLANTS BECAUSE I CONVERT THE NITROGEN IN THE AIR INTO A FORM THAT PLANTS CAN USE FOR GROWTH. IN RETURN, THE PLANS LOVE ME AND HELP ME TO SURVIVE BY GIVING ME FOODS SUCH AS AMINO ACIDS AND SUGARS," SAID RHIZOBIUM AND BEING THE SHY ONE, QUICKLY VANISHED.

We soon moved to the p
loaf of bread lying on a
microscope to use and s
one cell.



"WELL, YOU WOULD DEFINIT
THE FUNGUS. "I'M YEAST! IN T
SACCHAROMYCES CER
SO, I EAT THE SUGAR I
AND MAKE CARBON DIOXIDE,
BREAD TO RISE. I AM QUITE
WHEN THERE'S NO OXYGEN AN
EXPLAINED THE FUNGUS A

Next, we found a microorgan
the microscope to find it! Th
mushroom.



"I AM SHIITAKE MUSHROOM.
THE GILLED MUSHROOM. I H
WITH A STEM," SAID THE M

pantry of the office, to find a single plate on the table. We put the saw a **very tiny fungus with just**



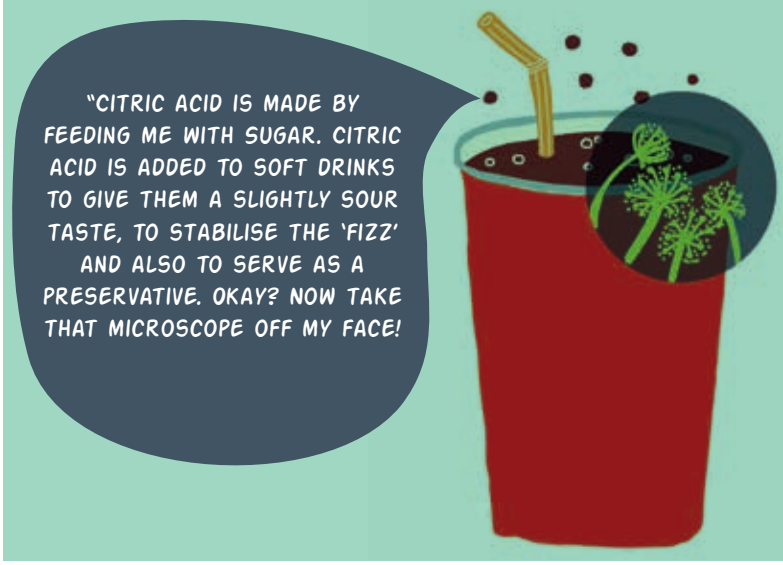
ELY HAVE HEARD OF ME!" DECLARED THE BAKING INDUSTRY, I'M ALSO CALLED EVISIAE. I LOVE EATING SUGAR. N THE FLOUR OF DOUGH MIXTURE THE BUBBLES OF WHICH CAUSE THE COOL BECAUSE I CAN ALSO RESPIRE D AS A RESULT, CAUSE FERMENTATION," ND WENT BACK TO EATING SUGAR.

While in the fridge, we also happened to zoom the microscope into our favourite flavour of yogurt. Lazing around in it was a microbe!



"HEY GUYS, I'M THE BACTERIA LACTOBACILLUS. I USE THE SUGAR IN MILK AS FOOD AND PRODUCE LACTIC ACID AS A WASTE PRODUCT. IT'S THIS WASTE THAT CAUSES MILK TO CURDLE," SAID THE BACTERIA AND WENT BACK TO CHILL.

As we shut the fridge, we decided to take a break. So, we sat down for lunch. We were curious to find out if our staple fuzzy drink too had microorganism in it. So, we ordered one, and boy, it sure had some! Out came **the fungus, Aspergillus niger.**



"CITRIC ACID IS MADE BY FEEDING ME WITH SUGAR. CITRIC ACID IS ADDED TO SOFT DRINKS TO GIVE THEM A SLIGHTLY SOUR TASTE, TO STABILISE THE 'FIZZ' AND ALSO TO SERVE AS A PRESERVATIVE. OKAY? NOW TAKE THAT MICROSCOPE OFF MY FACE!

nism in the fridge. We did not need is was none other than **the**



I AM A FUNGUS COMMONLY KNOWN AS AVE A SPORE-BEARING FRUITING BODY USHROOM AND DOZED OFF JUST LIKE THAT!

We were amazed - Microorganisms are everywhere!

And not all are harmful. Some are a vital part of our daily lives.

Special Cooker

Hi, everyone! Today, I am going to tell you my story. I hope you'll appreciate it.



Though I don't remember the exact date of my birth, it was some time in 1679 that I came into being. Denis Papin, a French physicist and mathematician brought me into your world. He made me look like a large cast iron vessel with a lid that could be locked. I raise the boiling point of water and hence, cook food in shorter time.

At that time, they called me 'digester'. However, it was difficult to handle me because of my structure. Regulating the steam and temperature was difficult. So, explosions were common. One of the explosions in front of the Royal Society in London made Papin build an interesting modification into me.

He gave me a safety valve that allows steam to escape if the pressure goes beyond the capacity I can handle. This valve helps me keep myself from exploding.

By the 19th century, I became compact and handy. Small domestic versions came into being. In 1925, I was named 'Pressure Cooker'. In 1939, the first commercial pressure cooker made by the National Presto Industries was exhibited in New York's World Fair. Since then, my lifestyle has changed and I started ruling the kitchen of every human! ■



While watching the valve move rhythmically up and down, the idea of a piston and cylinder engine struck Papin's mind.
Isn't that interesting?



What Papin actually set out to build was a digester - something that could cook meat and soften the bones in quicker time.

The Time Travelling Kumars

Sherlock Diaries 13

Written by: Sasikanth C

Illustrated by: Pooja Prabhakaran












The Kumars and Sherlock Holmes sit around the table for lunch.
Mr. Holmes, we are waiting for you. In India, we do not start eating till the guest starts. For us, "athithi devo bhava" (guest is God).
Oh! I am waiting for my knife and fork. How do I eat my food without those?
Mom, you sit. I will go get them from the kitchen.
My mistake! I completely forgot. Since we eat with our hands, the thought of knife and fork did not come to my mind.



Continued in 'Web Only' section of bwmag.in

Who Was Gobbler?



based on idea by
Kavitha Chandrasekar, 13,
St. Joseph's Anglo Indian Girls' Higher Secondary School,
Tamil Nadu.

One fine morning, mom tried to wake up the lazy, sleeping Priya. Since she did not wake up even after a lot of time, her mom zapped her with an XYZ neura-pulse.

Priya sprang up and looked at her mom as if to ask why she was woken up so rudely.

''It is your first day at school and the school aircraft will soon be here to pick you up. So, get up and get ready, pronto!'' her mom stressed, as if she could read Priya's mind.

"But Mom, I already told you that today, I will not go to school in the aircraft! I will use the teleporter that I completed building yesterday," Priya complained.

Priya's father had just established a school - The Jubilant Kids School - on Jupiter. Priya would also to study in it. Being the first day, she had to go there early and help her father with the preparations.

As soon as she was ready, she stepped into the teleporter and within seconds, she was on Jupiter! She was surprised (and secretly delighted) to see many extraterrestrial living beings come to study at the school. She would meet so many new people and learn so much!

As the inauguration session started, Priya found herself sitting next to Gobbler - a cute little alien from Grade 5. He was two years younger than she was. They instantly hit it off and had a great day. They had lunch together and played together.

When it was time to go home, Priya waited outside Gobbler's class to bid farewell for the day. But, he didn't come out. She looked everywhere, but didn't find him. She asked the others in that class, but none even knew him!

Finally, Priya gave up and went home. Her dad had already reached and working on his laptop. Seeing Priya confused, he asked what the matter was. Priya told her dad everything. 'Gobbler?' her dad wondered out loud. "No one by that name studies at our school. I am logged into the school's server and have just rechecked."

Priya was bewildered now. Who was the mysterious Gobbler who made her first day at a new school, on a new planet, memorable? Would he show up tomorrow? ■

Write a sci-fi story in not less than 150 words and email it to us at **brainwave@ack-media.com**. The best entry gets published as well as wins a merit certificate.

YOU ARE WHAT

From the house of Amar Chitra Katha and Tinkle

BRAINWAVE™

SCIENCE IS JUST A GAME

YOU ARE WHAT YOU EAT

MICHAEL POLLAN





Artwork: Ria Rajan



From the house of Amar Chitra Katha and Tinkle

BRAINWAVE™

SCIENCE IS JUST A GAME



Winners of various activities in the March 2014 issue are:
Treasure Hunt: Visakha Vinod
Toy Box: Manu Sharma
Ask Us Why: Aryan Goel
Fan Fiction: S G Atul Chand
Magic Science: Soumya K
Planet Ninjas: Shreya Kandpal
Sci-Q Time: Simra Siddiqui
DIY: No one
Smartenstein: Jaganathan Kamath
Student Board Nomination: Shreya Kandpal
Science X-Plained: No one

Winners of April 2014 issue are:
Eye See: Roshini Kalliath
Ask Us Why: Ashish Panigrahi
Fan Fiction: Neel Chatterjee
DIY: No one
Arby Files: Pranavi Pradhan
Smartenstein: Anita Banerjee
Science X-plained: No one
Editor's Special: Roshan Zameer

Dear friends, please be sure to include your name, age, school, picture and appropriate subject line when you send us your answers.



Letters from Readers

Dear team Brainwave,
I love your magazine. Once I took the magazine to school and was caught reading it during the science class. When the teacher saw this, instead of scolding me, she started to praise me for bringing such a useful magazine! There is one more thing I have to tell you - I was the winner of the Fan Fiction contest in the month of January 2014. I still have not received the gift. Can you please look into it?
Aniket Allakky – via email

Dear Aniket,
Great that the teacher did not scold you, though you should really have been paying attention in the class :) Regarding the prize for winning the Fan Fiction content, you must have received it by now. I just checked.
SK, Editor

The April Issue was great! The theme 'Exam Fever' helped me a lot. Many boring things to study have been made interesting! I was finding it difficult to memorise the elements of the Periodic Table, but after the trick I learnt in the April 2014 issue, it was just a cakewalk!
But, since it was the Exam Fever issue, it could have been published in March. It would have helped the readers more had it been a month before.
Nachiketa S R – Via email

Dear Nachiketa,
A very valid point, that. But, we did not estimate that our readers would appreciate the issue so much. A lesson learnt :)
SK, Editor

I am a big fan of BW. You guys are so cool. The issue 3 (March 2014) was fantastic. Toy Box and the Smarties were excellent. Hats off and keep up this good work!
Benjamin – Via Facebook

Dear Benjamin,
Always great to hear such feedback. Please continue giving feedback and we will leave no stone unturned to produce the best quality content for you all!
SK, Editor

The Physics Hero

by **Bhoo**

Dr. Amol Dighe is a professor of physics in the Department of Theoretical Physics at the Tata Institute of Fundamental Research. He works in the area of High Energy Physics, which aims to understand the nature of fundamental interactions by studying properties of elementary particles.

Dr. Amol is one of the first Indian Bronze Medalists at the International Mathematics Olympiad held in Germany, in 1989. He has received the Institute Silver Medal from IIT Bombay and the Worldlab-CERN John Bell Scholarship. He was the Leader of the 'Max Planck - India Partner Group' in neutrino physics and astrophysics for five years. He has been elected Fellow of the Indian Academy of Sciences, has won the Swarnajayanti Fellowship from the Department of Science and Technology, and is the recipient of the Shanti Swarup Bhatnagar Award.

Q Keeping the scene from the movie 'Swades' in mind (where Mohan tries to explain his job at NASA to villagers) - how would you explain your work to a lay man?

A I try to understand how the Sun shines. The Sun is not a ball of fire, it is a nuclear reactor. Since it is the major source of our energy, it is important to understand how it works. To understand what is going on inside the Sun, we have to look at what comes from the Sun. We, of course, get light that gives us heat, but that comes only from the surface of the Sun. If we have to understand the inner working of the Sun, we have to look at other particles called 'neutrinos', which reach us straight from the core of the Sun. I try to study the properties of these particles. These will tell us how exactly the Sun, and all the stars, shine.

Q Looking down the memory lane, what incident changed your outlook to life?

A I vaguely remember a magic show I had seen during my school days. At the end of the show, the magician explained how some of the tricks were done, and told us that there is nothing like magic; all you see are just tricks. Our eyes, ears and brain are easily fooled, but the laws of nature can't be broken. This somehow taught me that we should always try to find out rational explanations for whatever we see, and question even our senses or intuition at times.

Q Which discovery in the history of mankind do you think changed the way we live?

A I think it is the discovery of electricity and magnetism, and the



Artwork: Ria Rajan

realization that the movement of electrons is responsible for almost all the things we observe.

Q Do you think that in today's world of competition, success and learning go hand in hand? How can students overcome pressure and succeed while doing what they love?

A Education is, of course, important. It opens up many options for you to choose from. It gives you the basic skills that are required for anything you want to do. So, learning is definitely important. However, learning does not only mean knowing more information. It is also about understanding, thinking about, and applying that information. Students often feel the pressure because they are thinking of only a narrow set of opportunities out of which they ned to grab one. They should realize that opportunities exist in many directions, and what they should look for is an opportunity in the area of work they love. There is no substitute for hard work, but if you work hard for something you like, you will not think of those efforts as a burden.

Q Science is in everything we do - music, dance, movie making, cooking, sports, etc. How much of a necessity would you say it is to know/understand science to excel at these?

A Science is not just something you read in a textbook or do in a lab. In any field, you are using the methods of science, or applications of science, knowingly or unknowingly. It may not be necessary to understand this at a basic level, but knowledge of how things work will always keep you one step ahead if you want to be among the best in these areas. The best professionals in these fields are already using science.

Q Why would you say it is important to learn science?

A Science is perhaps the only way we know that can give us reliable and objective knowledge of the world around us. If we understand how things work, we can use them better. We can improve on them and in turn, improve our life. Science also teaches us to think critically and logically, and helps us separate reliable information from unreliable information.

Q Some believe that science is a field only for men. Your comments please?

A That is definitely not true. There are many prominent women scientists who have done significant work. The number of women in science could be more, and the situation is improving. There is a very nice book, 'Lilawati's daughters', which has biographical and autobiographical essays by women scientists in India, including active young researchers who can be role models for anyone aiming to be a scientist.
(The essays are also available at the URL - www.ias.ac.in/womeninscience/liladaug.html)

Q Is science only for students in urban areas? Do you think Science communication needs to be done at grass root and rural level?

A As I mentioned above, science is not just textbook knowledge. Knowing how to get better yield from crops, how to store and transport produce, and how to get enough water and power in villages are all scientific questions. There is science in the way we cook our meals and cool our homes. Moreover, the boundaries between rural and urban areas have started to disappear, and the lack of science knowledge should not limit the opportunities available for someone in rural areas. Science communication is needed for all, whether urban or rural.

Q What are the three things that you would suggest that our young readers take seriously in life?

A Do I try to excel at what I do?
Does my work help others?
Have I learnt something new recently?

Q Would you recommend your career to others? What attitude is needed to excel in that field?

A Oh, definitely! The career of a scientist is a very exciting and satisfying one. It allows you to do what you like all day, while getting paid for it. However you will need a few things. The first is, of course, love for science, curiosity to know about the world around us. You also need to be able to ask questions without worrying about whether the question is stupid or not. And once you get a reliable answer to the question, you should be able to accept it, irrespective of your prejudices.

Q Please share an inspirational incident in your life that our readers may not have heard before.

A When I had joined the University of Chicago for my Ph.D., I was still in the standard mode of learning physics - by reading books, solving problems, getting the right answers, and feeling satisfied. A couple of months after joining the university, I had gone to listen to a talk in which the speaker described an experiment he was going to perform. I asked, "What answer do you expect? What have others found?" The reply was: "What do you mean? We will be the first in the world to do this experiment, and what we find will be the answer." That, somehow, conveyed to me the spirit of world-class research: you do something that no one in the world has done before. That is the thought that has been inspiring me throughout my career. ■



Salt, Salt, baby!

We are using salt to make ice cream! But, why?

by **Pushkar Samant**

Artwork: Kashmira Sarode

Do you like ice cream? Would you love to make it at home?

Then try this out.

- Take two metal glasses.
- Pour some milk into both the glasses.
- Add two spoons of sugar, a bit of custard and some vanilla flavour to each glass.
- Mix well.
- Now, take some ice in two bowls.
- Pour some rock salt over the ice in one bowl.
- Place each glass in a bowl.
- Keep both bowls in the refrigerator for a couple of hours.

Observe both the glasses after two hours. What do you see? Why did we use salt? Research on the Internet, try out the task yourself and email your answer to brainwave@ack-media.com to win a cool comic book! ■

BW STUDENT BOARD

The BW Student Board members work with our editorial team and make a difference to the magazine.

In addition to this, their work is published in the magazine and they get to lay their hands on all BW products before anyone else - for free!

At the end of their tenure, we award them with certificates and an honorarium of Rs. 1000 each.

www.bwmag.in/student-board



Join us on our fun-do video channel as *Mr. X* performs some amazing experiments and *X-plains* the science behind them.

Mr. X will perform and publish your experiments too! If published, you will win a surprise gift. Just email your experiments in detail to brainwave@ack-media.com



Artwork: Abhijeet Kini

YouTube

www.youtube.com/Brainwavemag

June's a boon

by **Priyanka Talreja**

June's a scientific wonder for India. Let's find out why!

This Month That Year:

It was on 25 June, 2002 that the European Union and India agreed to bilateral cooperation in the field of science and technology. The purpose of the agreement was to encourage and facilitate cooperative research and development activities in the fields of science and technology between the European Community and India.

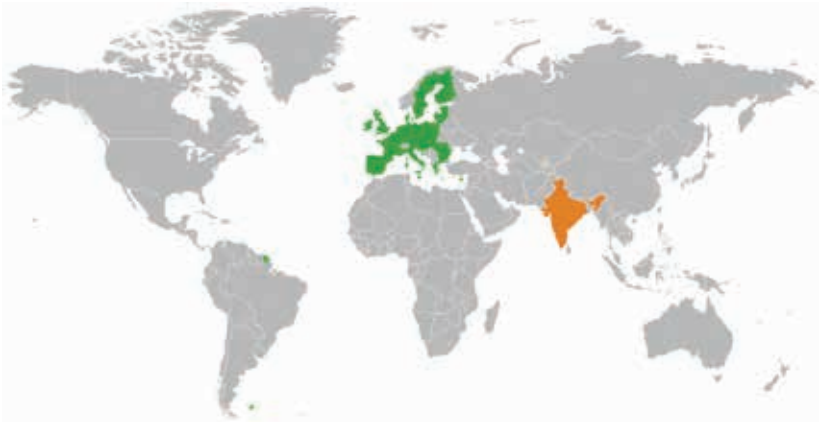


Image Source: Wikimedia Commons

This cooperation covers all activities of research, technological development and demonstration (RTD). It also emphasizes on the appropriate protection of intellectual property rights.

As an outcome of this, a joint group of EU-India scholars was formed to further promote joint research and development.

Now, India holds observer status at CERN while an India-EU Software Education and Development Center is due at Bangalore. ■



Day to remember:

In June, India saw the birth of the great Chemist Chintamani Nagesa Ramachandra Rao, also known as C.N.R. Rao.

Born on 30 June, 1934, Dr. Rao worked mainly on solid-state and structural chemistry. Currently, he serves as the head of the Scientific Advisory Council to the Prime Minister of India. Rao has honorary doctorates from 60 universities from around the world! He has authored around 1,500 research papers and 45 scientific books. He is the recipient of most of the major scientific awards, and is member of all major scientific organisations.

On 16 November, 2013, the Government of India presented him with the Bharat Ratna. This is the highest civilian award in India. This makes Dr. Rao only the fourth scientist to achieve the award, after Sir C.V. Raman, Sir Visvesvaraya and Dr A. P. J. Abdul Kalam. ■

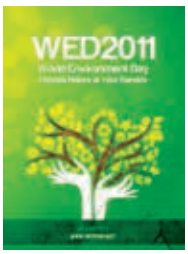
Scientific June

Here comes all the science awesomeness that June has to offer. Hold on tight as we go for a sci-ride.

by **Priyanka Talreja**

DATES TO REMEMBER:

June 05 - International Environment Day



This day is hosted every year to raise global awareness of the need to take positive environmental action. This day came into being in 1973 when the United Nations Conference on the Human Environment began. World Environment Day is hosted every year by a different city, with a different theme. ■

June 08 - World Ocean Day

World Oceans Day gives us an opportunity every year to honour the world's oceans, celebrate the products they provide, such as seafood and marine life for aquariums, and also to appreciate their intrinsic value. The theme for the World Oceans Day 2013 & 2014 is: Together, we have the power to protect the ocean. ■

June 14 - World Blood Donor Day



Transfusion of blood, and blood products help save millions of lives every year. To take this awareness further, the Blood Donor day is celebrated across the globe. An adequate supply can only be assured through regular donations. The World Health Organization aims for all countries to obtain all their blood supplies by 2020. Today, it's only 62 countries that have national blood supplies based on close to 100 per cent voluntary unpaid blood donations. 40 countries still depend on family or paid donors. ■

THIS MONTH, THAT YEAR

June has been iconic as far as science history is concerned.

- It was in this very month in 1905 that Einstein introduced his special theory of relativity. This theory appeared in a paper called 'On the Electrodynamics of Moving Bodies' in the German Physics Journal. Einstein combined Maxwell's electricity and magnetism equations with mechanics, and made adjustments to the physics of bodies approaching the speed of light.

- June was also the month in which the first nuclear power station was set-up, in 1954. Known as the Obninsk Nuclear Power Plant, this plant in the USSR began operations to become the world's first nuclear power station to connect to a public power grid. The electric output of the station was 5 Megawatts. The station was shut down in the April of 2002 when it proved unprofitable to continue operations.

- In June, Landsteiner, an Austrian physician developed the modern blood type classification system by identifying the agglutinins[G] in blood. Later, along with Alexander S, he refined the system by identifying the Rh factor[G]. In 1930, Landsteiner won the Nobel Prize for medicine, for the discovery of blood types.

Image Source: Wikimedia Commons



Why kids eat chalk

by **Skree!**

Image Source: Wikimedia commons

Children usually try to taste almost everything. However, if a kid has a special interest in chalks, then the meaning of such an act might be different. The reason for 'dependence on chalk' could indicate the deficiency of calcium in the child. It can also be a side-symptom of anaemia or lack of haemoglobin.

A child's body needs large amounts of calcium, e.g. 4-6year-olds need 900mg per day and 7-10year-olds need 1100mg. This is essential for normal development of bones, formation of healthy teeth and gums, as well as for the growth of muscles. Without calcium, children get tired quickly and often fall sick.

To fulfil their daily need of calcium, children eat chalk.

It's tasty!

Speaking of tasting everything, do you know how we can sense the taste of a food item? Whenever we place food in our mouth, the tongue translates a 'chemical taste signal' into a neural code that the brain can interpret. 100% exact science related to this is yet to be decoded, but the key elements are known:
While we are chewing, food releases chemicals that immediately travel up into our nose. These chemicals trigger the olfactory receptors[G] inside the nose. They work together with our taste buds to convey the true flavour of that yummy food we just ate to the brain.

By the way, did you know that the average person has 10,000 taste buds? ■

Why can omnivores taste sweets, but carnivores can't? Research and write to us at brainwave@ack-media.com to win cool comics!

The World of Junk



Today, junk food has become a regular part of our lives. We don't go a week without craving for it. What's junk food? And why do doctors say that it is bad?

Let's find out!

The content published here has been compiled by the Centre For Science and Environment (CSE) and published in the book titled - Junk Food Busted, Why and How. Brainwave has acquired all necessary permissions to reproduce it.

What's junk food anyway?

There is no 'official' definition of junk food. But, you will be surprised to know how the medical dictionary broadly defines it - "any food, which is low in essential nutrients and high in everything else, calories and sodium in particular."

Most junk foods fall in the category of either 'snack food' or 'fast food', which we have conveniently defined as 'ready-to-eat' food.

The bottom line: Junk food is food that is high on calories and low in nutrition.

Are Indians really into junk food?

According to the National Restaurant Association of India (NRAI), the fast food industry in India is estimated to be worth between Rs 6,750-8,000 crore, growing at an average of 35-40 per cent! A major chunk of this market is ruled by global players like McDonald's, Yum! Brands (Kentucky Fried Chicken, Pizza Hut and Taco Bell), Domino's, Coca Cola and Barista.

But, domestic players are not lagging behind. Nirula's Pizza Corner, the Coffee Day Group, Haldiram and Bikaner Wala capture a fair share of the fast food segment. So yes, we do eat junk food...lots of it!

So really, how 'fat' is India? How much trouble are we in?

In India, 14.8 per cent of women and 12.1 per cent of men are obese or overweight. This is according to the third National Family Health Survey (NFHS) data (2005-06).

What about children? How vulnerable are the young ones?

Research indicates that 77 per cent of obese children in India would end up as obese adults. While it is known that insulin resistance and diabetes are particularly high in adult Asians, the question is about children.

More importantly, does childhood obesity hurt us even when we grow older? Studies say it does. Overweight and obese children are at substantial risk of developing multiple cardiovascular problems.

So, why do we feel junk food cravings so regularly? In a study, researchers identified a similarity in dopamine production levels between drug addicts and junk food addicts!

Dopamine is a neurotransmitter. Simply put, it's a chemical 'messenger' that helps in the 'transmission' of signals to the brain.

Addiction to drugs causes the brain receptors that receive dopamine signals to lose their capacity to respond. As a result, addicts require increasing amounts of the addictive substance to receive the same level of satisfaction. The same applies to junk food.

Studies have also shown that as early as by the age of 30, arteries could begin clogging and create base for future heart attacks. Osteoporosis[G] and hypertension are the other diseases that appear to strike in childhood when lifelong eating habits are being formed.

How exactly does junk food affect our health?

Junk food induces gorging that leads to obesity. A study published in 2009 in The Journal of Clinical Investigation has shown that the fat from fatty acids affects the brain. It suggested that when we eat food high in fat, the brain gets 'hit' with the fatty acids, and the fat molecules cause the brain to send messages to the body's cells, warning them to ignore the appetite-suppressing signals from leptin and insulin - hormones that are involved in weight regulation. And since the body does not get the signal that it is satiated, we tend to overeat.

Another study published in *Neurology* shows that eating too much junk food or food rich in transfats can shrink the brain similar to that associated with Alzheimer's disease! The study also showed that if the diet is rich in vitamin B, C, D and E and high in omega-3 fatty acids, the brain benefits from it. Though this study was done on a set of people above 65 years, it is known that the impact of trans fatty acids begins to take place at the fetal stage.

There's more, folks. Studies have also shown that too much junk food alters the chemistry of the brain and is addictive like cocaine. High-fructose corn syrup (HFCS), monosodium glutamate (MSG), hydrogenated oils, refined salt and various other chemical preservatives found in processed junk food do the same damage to our brain as cocaine does.



Another study conducted by researchers at University of Texas in Austin (UT) and the Oregon Research Institute in the US found that prolonged consumption of junk foods results in reduced activity in the striatum, a section of the forebrain that registers reward. ■

Brainwave says: Junk food is all around us and is clearly bad for our health. But not consuming it at all is not practical. What we can do is closely watch what we eat and become more aware of how different foods affect us. Practising a little caution will go a long way.

Corn for Cars, Jatropha for Jets.

This story was sent to us when the writer travelled into the future...

Oh, it is so different and beautiful, nice and clean to be here! Indeed, things have changed drastically. Astonished, I started looking for a petrol pump to fuel my bike. As soon as I started the bike, two robocops came out of nowhere and took me into custody before I could say anything or explain anything.

I was taken into a plush modern looking institute named *The Biofuel Research and Development Centre,* and questioned for over an hour. Finally, after I explained everything about myself, the facility head explained the reason for arresting me. It was compulsory to run vehicles on biofuels - petrol or diesel wasn't allowed. While I was digesting what he said, he started explaining further.

"We no more use fossil fuels. We shifted to biofuels, which can be easily obtained from crops like wheat, rice, corn, sugarcane, jatropha and other nonpolluting sources," he said. Surprised, I asked, "Has it really become possible?"



Drax Power Station Biofuel Production Plant, Goole, East Riding of Yorkshire, England.

Image source: Wikimedia Commons



Miscanthus Biofuel crop

"It is no more a big deal. We get biodiesel from wheat and biopetrol from sugarcane. By refining and fermenting the crops, ethanol is obtained. You just add a few kilograms of crop to the synthesising tank of the vehicle," he explained and gave me a few litres of biopetrol.

When I thanked him, he said, "Thank you for researching it extensively in 2013. Your preliminary research served as a base for the advancements you see," and bid me farewell.

I started back to the present with a renewed vigour to continue my research. ■

Name any five biofuels and their sources. Research and email them to us at brainwave@ack-media.com to win a nomination to our Student Board and a surprise gift!

TECH FOR FOOD

These are the technologies that help in preserving and processing food.

by **Alby**

Thermo-sonication

The main reason for good food turning bad is the development of microorganisms. The combination of ultrasound and heat at moderate temperatures can help in microbial inactivation. For milk, this is a useful alternative to pasteurization - the effects are comparable with conventional pasteurisation and at the same time, the



severity of temperature exposure is reduced, retaining the nutritionally favourable characteristics of fresh milk. ■



Artwork: Jeenal Patel

Make your food 'light'

What will happen if light that is 20,000 times the strength of sunlight that falls on the Earth is pulsed on to any living organism? We can't even imagine, right? Such very intense white light is used to preserve food. This treatment inactivates bacterial spores and destroys microbes through rapid surface heating, without really cooking the food. ■

Pressure Packing

Mild heating while applying high pressure inactivates the development of bacteria. That is why pressure of 50 thousand to 120 thousand PSI is used to extend the shelf life of certain food items. The ultra-high pressure process was first used on a large scale in Japan for fruit products such as jellies and jams. This process can even be applied to heat-sensitive fruits and vegetables. ■



THE SMARTIES MISSION RED PLANET: EPISODE 5

STORY: SASIKANTH C & PRIYANKA TALREJA
ART & LETTERING: POOJA PRABHAKARAN

PREVIOUSLY... OFFICER SIMPSON AND OFFICER FLINT TAKE A LOOK AT THE FINAL 10 PROFILES PICKED BY THE 'COMMITTEE' FOR THE 'MEN TO MARS' MISSION ANNOUNCED BY VISION GALACTIC...



THE NEXT DAY...





DEAR SOON-TO-BE-MARTIANS! I AM YOUR CAPTAIN O'CONNER. WE PROMISE YOU NOTHING, EXCEPT THAT THIS WILL BE ONE HELL-OF-A JOURNEY. YOU'RE GOING TO EXPERIENCE THINGS THAT NO HUMAN EVER BEFORE HAS. YOU ARE GOING TO BE THE FIRST HUMANS TO SET FOOT ON MARS.

HAVE A GREAT MEAL AND GET GOOD REST TODAY. TOMORROW, YOUR TRAINING STARTS AND NO ONE KNOWS WHEN AGAIN YOU WILL GET A GOOD SLEEP.

CIAO!


SOME HIT IT OFF WELL...
HOLA, COMMANDER! WHAT A PLEASURE BUMPING INTO YOU LIKE THIS!
DO I KNOW YOU?
NO, SIR. BUT I KNOW YOU! WHILE RESEARCHING FOR MY WAR FILM 5 YEARS AGO, I BUMPED INTO YOUR PROFILE AND READ ALL ABOUT YOU. THE PROTAGONIST OF MY MOVIE 'LION'S DEN' IS INSPIRED BY YOUR EXPLOITS AROUND THE GLOBE.
WHILE OTHERS...
YOU ARE THAT BILLION DOLLAR IPO WHIZ KID, HUH?
YES, SIR! 10 BILLION, ACTUALLY.
DON'T BE SO ARROGANT, SON. YOU ARE TOO YOUNG AND DON'T HAVE THE MATURITY THAT AGE GIFTS US WITH. DOLLARS WILL MEAN NOTHING ON MARS. TREAD WITH CAUTION AND HUMILITY.
TO BE CONTINUED...

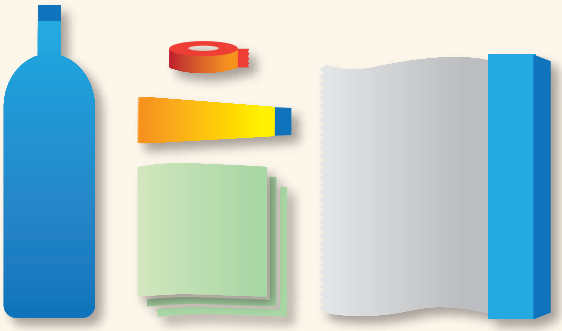
Keep it warm!

How about making your own hot storage bottle?

by **Pushkar Samant**

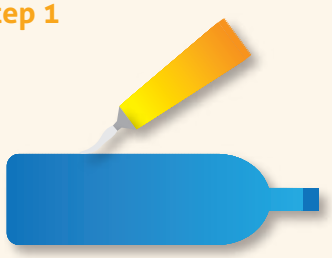
You will need:

- A glass bottle
- Paper towels (10)
- Aluminium foil
- Glue
- Tape



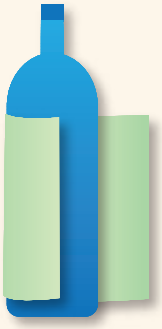
Method:

Step 1



Apply the glue on the surface of the glass bottle.

Step 2



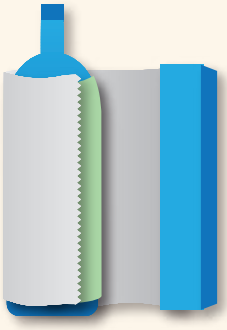
Wrap one paper towel around the bottle as shown.

Step 3



Repeat step two with the remaining nine paper towels. Stick them one on one.

Step 4



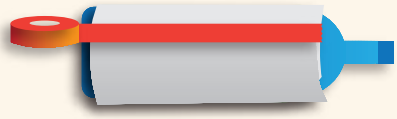
Now, take the aluminium foil and wrap it around the bottle.

Step 5



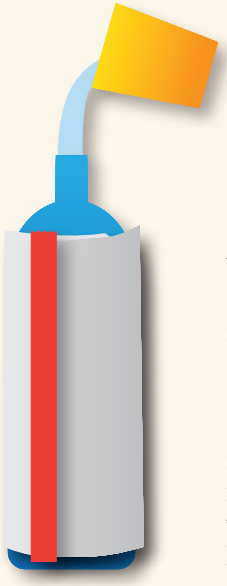
Repeat step four with two more sheets of foil.

Step 6



Use tape to stick the foil well. Make sure that there are no gaps through which air could get in.

Step 7



Your hot storage bottle is now ready!

Pour hot milk or water into it and observe for how long it would remain hot.

How does it work?

Aluminium foil has one good property - it controls the loss of heat energy. Its shiny surface does not let radiant i.e. thermal or light energy pass through itself well.

However, it is a good conductor of heat. To prevent the heat transfer to aluminium, paper towels are wrapped around the bottle first.

Paper towels and aluminium foil together act as good insulation.

Artwork: kashmira Sarode

Do you know of any such useful and cost-effective do-it-yourself activities? Share them with us at brainwave@ack-media.com and the winning entry would be published as well as gifted with a merit certificate!

Treasure Hunt!

You must be aware of the grind by now. The Treasure Hunt leads you to the theme of the next issue. Take your magnifying glass out and become the adventurer. Follow the words or phrases marked in pink in this issue and use them as your clues.

Look closer and you will find enough clues to get you cracking. What are you still waiting for? Get started and finish fast, to better your chances of a win!

The top entry will win a summer special pack of cool ACKs and Tinkles. Email your answers to brainwave@ack-media.com with 'Treasure Hunt' as the subject.



Artwork: Sarthak Sinha

Be a Smartenstein!

We run more than ten activities and contests in each issue. They can win you many exciting prizes.

Participate in all the activities of an issue, and you can win a merit certificate, the title 'Smartenstein' and a mystery gift - every month!

There are more than 10 activities and contests in this issue. Turn to the index on p02, check the features marked with a '★' out, and participate in them.

What are you waiting for? Settle down with your favourite snack and get started!

www.bwmag.in/category/bw-smartenstein

That Delicious Sofa Sponge

Some people could easily eat glass, metal, sofa sponge, etc. Can't believe it? Read on!



Artwork: Pooja Prabhakaran

by **Pushkar Samant**

People do like different types of food. Some enjoy spicy food, while some love sweets and others find cheesy dishes delicious. But, do you know anyone who eats metals? Or munches concrete as if it were a cake and chews down pieces of glass?

Kesha from the USA eats half a roll of toilet paper each day. Josh also can't stop eating glass and has special interest in light bulbs. And he's not alone. There are more.

Adele Edwards from the UK eats sofa sponge for snacks, while Michel Lotito was famous for eating metal, glass and rubber. He consumed bicycles, shopping carts, televisions and much more!

Well, there's a reason behind their strange behaviour. All these people are diagnosed with a medical disorder called Pica. Pica is seen in people of all ages, but is particularly common in pregnant women, children and those with developmental disabilities.

Sufferers feel like eating nonfood items. This craving is a response to extreme iron deficiency. There is no cure for the disorder yet, but doctors arrange therapy. Just don't start eating nonfood items! ■

Why is it called Pica?
The name comes from the Latin word for Magpie, a bird that eats almost anything.

How does our digestive system work? Can it digest such non-food items? Research and email to brainwave@ack-media.com to win a cool surprise gift worth Rs. 150!

FOODS THAT AFFECT OUR MOODS

by **Arby**



Food can make you happy,
Food can make you sad,
Food has such power great,
Even science agrees to that fact!

Consuming food affects the body's neurotransmitters,
These are nothing but mood chemicals produced in the brain.
These chemicals influence our emotions and energy,
That's why mood swings we get, so many!

Examples of foods that help you be relaxed...
are pumpkin seeds, leafy greens and almonds, dear lad!
It's magnesium that gets depleted under stress, from our system,
These foods supply it - a mineral that helps us stay calm.

Foods that we can eat to be happy...
are beans, peas, meat, fish and poultry!
They contain folate, and vitamin B6 and B12,
These vitamins work to keep homocysteine levels low,
deficiency of these would lead to depression, you know!

The foods that let you be alert are avocado, banana and beans.
They boost alertness and concentration in human beings!
Such food contain tyrosine that builds the neurotransmitters dopamine and norepinephrine!

So, now that you know what to eat to be happy, calm and alert,
We will take your leave and see you with another cool poem next month! ■

p05
Pigments: A pigment is a material that changes the colour of reflected or transmitted light as the result of wavelength-selective absorption. These are the natural colouring matter of animal or plant tissue.

p09
Ionones are aroma compounds found in a variety of essential oils, including rose oil. These chemical compounds are an important fragrance chemical used in perfumery.

p15
Amino Acids: Amino acids are used in every cell of our body to build the proteins we need to survive. Even though scientists have discovered over 50 amino acids, only 20 are used to make proteins in our body. Of those twenty, nine are defined as essential.

p34
Agglutinins are substance that causes particles to coagulate (change to a semi solid state) to form a thickened mass. Agglutination is of great importance to the medical world as it serves as a diagnostic tool.

Rh factor is a type of protein on the surface of red blood cells. Most people who have the Rh factor are Rh-positive. Those who do not have the Rh factor are Rh-negative. The Rh factor is an agglutinogen.

p35
Olfactory receptors: The sense of smell, called olfaction, involves the detection and perception of chemicals floating in the air. Chemical molecules enter the nose and dissolve in mucous within a membrane called the olfactory epithelium. In humans, there are about 40 million olfactory receptors, while in the German Shepherd dog, there are about 2 billion olfactory receptors!

p37
Osteoporosis: Osteoporosis is a disease in which bones become fragile and more likely to fracture. Usually the bone loses density, which measures the amount of calcium and minerals in the bone.

Sci-Q Time

Finished reading the magazine? Answer this quiz to win a mystery gift worth Rs. 150! Email to brainwave@ack-media.com

1. What acid does vinegar contain?
2. What are Vitamins?
3. List out healthier alternatives to any five of your favourite junk food.
4. How are biofuels different from fossil fuels?
5. What is a vacuum flask? What is the science behind it?

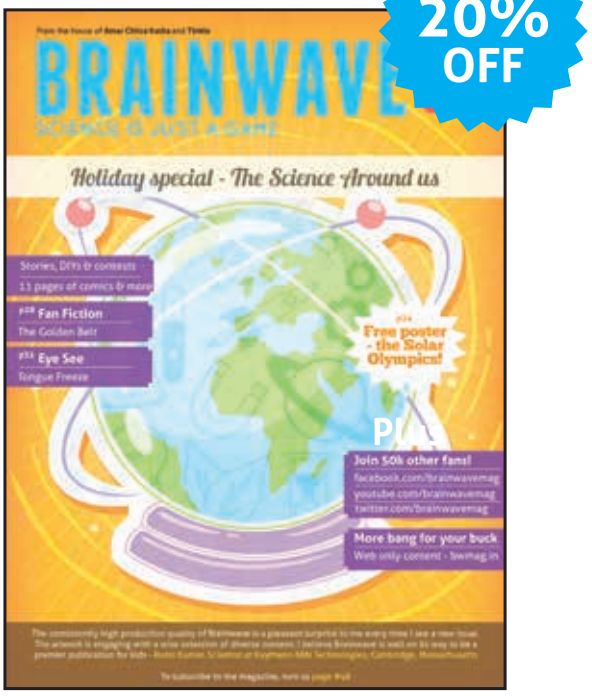
To take part in some cool science initiatives, visit *www.bwmag.in*

Here's something unique we are building for you:
www.brainwave-edu.com

Readers, get to see behind the scenes:
www.facebook.com/brainwavemag
www.brainwave-edu.blogspot.com

SUBSCRIBE NOW!

Pay only ₹ ~~720~~ 580! Get 12 issues of



Why pay ₹ 60 every month (that's ₹720 a year) at your news-stand to enjoy Brainwave?

Now, Brainwave is the perfect balance of science and fun, which will make you call your friends up and say, "Guys, let's play science!"

You get 48+ pages of comics, stories, experiments and contests. There is a Treasure Hunt too! You can win many exciting prizes and even be on our **Student Board**.

SUBSCRIPTION TYPE

☐ **1 year: Brainwave - ₹580**

☐ **2 year: Brainwave+Mystery Gift of ₹299 - ₹1150**

☐ **1 year: Brainwave+Tinkle magazine - ₹880**

Publisher, at its sole discretion, shall have the right to revise the offer or subscription price.

YOUR DETAILS*

Student's Name: _____

Guardian's Name: _____

Date of Birth: _____(DD MM YYYY)

Address: _____

City: _____

State: _____

School: _____

Class: _____

Email (Student): _____

Email (Guardian): _____

Tel. of Guardian: (R): _____

Mobile: _____

Guardian's signature

PAYMENT OPTIONS

☐ **CREDIT CARD**

Card Type: ☐ Visa ☐ MasterCard

Please Charge ₹____ to my Credit card Number below:

☐☐☐☐ ☐☐☐☐ ☐☐☐☐ ☐☐☐☐

Expiry Date: M M Y Y

Card member's signature

☐ **CHEQUE/DD**

Enclosed please find cheque/DD no. ☐☐☐☐☐☐

drawn in favour of 'ACK Media Direct Ltd.'

on (bank)_____,

for the amount _____,

dated D D / M M / Y Y Y Y.

ONLINE SUBSCRIPTION

Visit: *www.amarchitrakatha.com*

Email: *brainwave@ack-media.com*

ACK Media Direct Ltd., Krishna House, 3rd Floor, Raghuvanshi Mills Compound, Senapati Bapat Marg, Lower Parel (West) Mumbai - 400013.

* All fields are mandatory for the subscription to be activated.



BORN TO BE ME

Follow the voice inside,
the voice that makes you one of a kind.

CELEBRATING YOUR UNIQUENESS.



Scan with your smartphone &
join us on facebook/classmate

Email us at classmate@itc.in or call 1800 425 3242

classmate

BECAUSE YOU ARE ONE OF A KIND

ztzv No. MAHENG/2012/42382



WHAT IS BRAINWAVE?

Brainwave is a children's science magazine from the house of Amar Chitra Katha and Tinkle.

We understand that each child has a different aptitude and love for science. Hence, we simplify science into forms that excite them - comics, stories, fun-do activities, contests and fascinating facts.

Give your child a Brainwave, and science will be just another game!

Sweet Fire

Can we burn a sugar cube? Let's try.
Warning: Parental supervision is needed.

by **Pushkar Samant**

Place a sugar cube in a plate and challenge your sibling or friends to set it on fire. Normally, they will not succeed.

Then, you, like a super-science-hero, dab a corner of the cube with some ash from a burnt piece of paper and hold a burning match to it. You will see that the sugar cube begins to burn with a blue flame!

Ash and sugar cannot be separately ignited. But, ash helps initiate the combustion of the sugar cube.

Now, here is something you have to answer - What is a catalyst? What are examples? ■



Artwork: Jeenal Patel

Research and email your answers to brainwave@ack-media.com
The most original response can win you cool gifts worth Rs. 100!

Like us on Facebook
www.facebook.com/brainwavemag

SUBSCRIBE TO OUR DIY VIDEO CHANNEL
www.youtube.com/brainwavemag

Everyone dig deep into their food and eat in silence.



